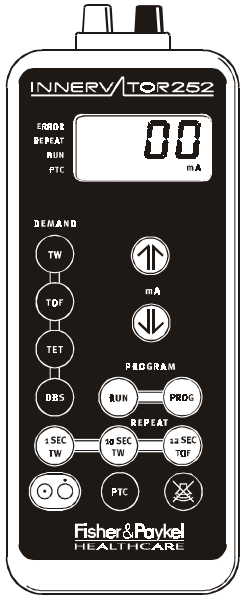
INNERVATOR252

Constant Current Peripheral Nerve Stimulator

OPERATING INSTRUCTIONS

English



The NS252 provides neuromuscular block monitoring for general anesthesia required for surgical procedures in the operating theater.

OPERATOR CONTROL BUTTONS

A. ON/OFF, POWER, MUTE BUTTONS

Switches the INNERVATOR252 on & off.

Sets the amount of current to be delivered by 10mA steps.
If CURRENT UP button is depressed the set current advances to 80mA. If CURRENT DOWN button is depressed the set current decreases to 0mA. Maximum set current is 160mA,
(To deliver 80 - 160 mA see Programming Features)

Mutes audible pulse delivery sound. To cancel press again.
Cannot be used to mute the audio alarm sound.

B. DEMAND BUTTONS

TW
Delivers a single pulse.

TOF
Delivers a train of four pulses where each pulse is 0.5 seconds apart

TET
Delivers a tetanus pulse train for as long as the button is depressed.

DBS
Delivers a Double Burst pulse train. DBS = three pulses 20 ms, a 750 ms lull then two **OR** three 20ms pulses, (see programming features).

PTC
Post Tetantic Count. Consists of five sec TET pulse, three sec pause, twenty twitch pulses at 1 Hz. For safety, PTC can only be activated once every five minutes.

C. REPEAT BUTTONS

Activates a preset pulse pattern. Press again to terminate the cycle.

1 SEC TW, (1 Second Twitch (1Hz))
Single pulse delivered at one second intervals.

10 SEC TW, (10 Second Twitch (0.1Hz))
Single pulse delivered at ten second intervals.

12 SEC TOF, (12 Second Train-of Four)
Train of four pulses repeated every 12 seconds.

D. PROGRAM, PTC BUTTONS

PROG
Activates programming capabilities. Press once to change settings, twice to store program.

RUN
Starts stored program. Press again to stop. Default program = Double Burst at 12 sec intervals.

VISUAL INDICATORS

CURRENT **mA**
Current delivered to the patient, shown in milliamps.

PULSE DELIVERY
Shown as a solid dot in the centre of a circle. It flashes every time a pulse is delivered.

MUTE
Indicates that audible pulse signal is muted.

PROGRAM **P**
Indicates INNERVATOR252 is in Programming mode

RUN **RUN ◀**
Indicates that the stored program is running.

PTC **PTC ◀**
Flashes to indicates that PTC, Post Tetanic Count pattern is running **OR** continuous display if safety lockout is still in effect.

REPEAT **REPEAT ◀**
Indicates that one of the three repeat pulse patterns, 1SEC TW, 10 SEC TW or 12 SEC TOF is running.

ERROR **ERROR ◀**
Indicates that the INNERVATOR252 is not able to deliver the specified current. Indicates excessive impedance, or disconnected leads or dry patient electrodes.

LOW BATTERY
Indicates that the batteries require replacing as soon as possible.

AUDIO INDICATORS

PULSE DELIVERY
Monotone, single beep every pulse.

AUDIBLE ALARM
Half second, monotone beep each time a pulse is delivered incorrectly AND, at the completion of the pulse train there is a 2 second continuous beep.

Indicates pulse does not fall within the tolerance limits each side of the set current. May be caused by, excessive impedance, disconnected leads or dry patient electrodes.

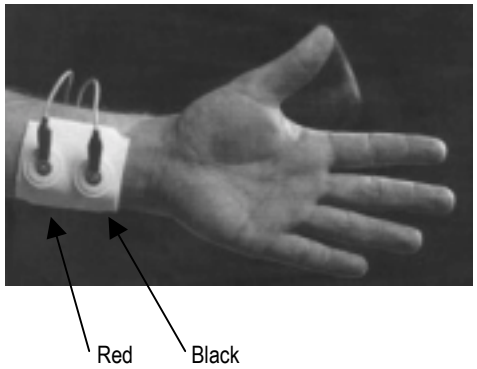
If the alarm sound is occurring repeatedly:

- Do not continue running a repeat function.
- Do not deliver any further pulses until the fault causing the condition is repaired.

USE & CONNECTION TO A PATIENT

Only shrouded lead sets (200NS033 (supplied), 200NS032 or 200NS031) may be used with the INNERVATOR252.

1. Ensure that the INNERVATOR252 is switched OFF.
2. Connect external lead to the INNERVATOR252, proximal (red, positive) to red socket and distal (black, negative), to black socket.
3. Connect the other end of the lead to the patient electrodes, usually attached along the ulnar nerve. Proximal (red) connector to proximal (red) electrode, distal (black) connector to distal (black) electrode.



4. **Following the induction of anesthesia** switch the INNERVATOR252 on and increase the current until desired level of supramaximal stimulation has been attained.

   NOTE: A two second continuous tone indicates that alarm conditions exist. This may be caused by excessive impedance, dried or faulty electrode(s), or disconnected or faulty leads.

5. After use, always ensure that the INNERVATOR252 is switched OFF.

Auto power shut-off after 30 minutes of non-use.
INNERVATOR252 will emit three beeps, if no buttons are pressed within next minute, INNERVATOR252 will automatically switch off. Press any button to cancel the automatic shut down for another 30 minutes.
Will not occur if running a repeat function.

DEFINITIONS

Type BF Applied Part

ATTENTION Consult accompanying documents

CE 0123
93/42/EEC
Class IIb

CLASSIFIED UL US
'PERIPHERAL NERVE STIMULATOR' WITH RESPECT TO ELECTRIC SHOCK, FIRE, MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH UL 2601-1, CAN/CSA C22.2 NO. 601.1
84DJ

WARNING: A WARNING statement refers to the conditions when the possibility of injury to the patient or user exists if a procedure is not followed correctly.
CAUTION: A Caution statement indicates the possibility of damage to the equipment exists if a procedure is not followed correctly.
NOTE: A Note statement provides additional information intended to clarify points, procedures or instructions.

***WARNING*:**

- *This device should not be used in a manner that allows trans-thoracic stimulation.*
- *Not to be used for Internal Nerve Location. Use recommended stimulator lead sets only. Do not use with needle electrodes.*
- *Dangerous voltages may exist within this device for up to ten minutes after removal of the batteries.*
- *This device is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.*
- *This product is intended for use by qualified medical practitioners and such persons should ensure that they are totally familiar with the use of the nerve stimulator before using the device.*

CAUTION:

Interference from electrosurgical units (diathermy), may be experienced. Ensure that the Nerve Stimulator is positioned away from electrosurgical unit. Lead-set should not run parallel to the diathermy lead and should not cross the diathermy lead at any stage.

Remove batteries if equipment is not likely to be used for some time. Clean with a damp cloth. All maintenance must be carried out by qualified personnel. For further information and technical data contact your Fisher & Paykel Healthcare dealer.

HOW TO PROGRAM

A. PROGRAMMING A PULSE PATTERN

1. Push PROG button to enter programming mode, (display will read P). Press again to store mode, (display will read P00ma).
2. Use DEMAND BUTTONS* ONLY to deliver desired pulse pattern. Any number may be pressed in any order.
3. Allow desired time interval between pulses to elapse between button pushes, (the display will count upwards in seconds). Each time a demand button is pressed the display returns to zero. Maximum elapsed time between button pushes is 99 seconds.
4. Push PROG again to store the program.
5. Reset the INNERVATOR252 to the desired current delivery level, (current is automatically zeroed during programming).
6. Push RUN to execute the stored program at set output current. Program will run until RUN is pressed again or unit is switched off. The RUN indicator will be displayed while program is running.

* *PTC button cannot be used when storing a program.*

B. PROGRAMMING TETANUS PULSE TO 50HZ OR 100HZ.

1. Push PROG button ONCE, (display will read P).

2. Push TET button to select Tetanus frequency. The frequency will be displayed as “50” or “100”.

NOTE: There is no visual indicator to display TET frequency when in use. However the 100Hz audio indicator has a faster pulse delivery sound than the 50Hz.

C. PROGRAMMING THE MAXIMUM CURRENT SETTING TO 80mA OR 160mA.

1. Push PROG button ONCE, (display will read P).

2. Push CURRENT UP button to select maximum current at 80mA. “Lo” will be displayed to indicate the maximum current is 80mA. Pressing the CURRENT UP button again will select the maximum current at 160mA and “Hi” will be displayed.

   If 80mA is programmed, depressing the CURRENT UP button will increase the current in 10mA steps to 80mA.

   If 160mA is programmed, depressing the CURRENT UP button will increase the current in 10mA steps to 80mA. To set beyond 80mA, the CURRENT UP button **must be pressed and released** each time a further increment of 10mA is desired.

D. PROGRAMMING THE DOUBLE BURST STIMULATION PATTERN.

1. Push PROG button ONCE, (display will read P).

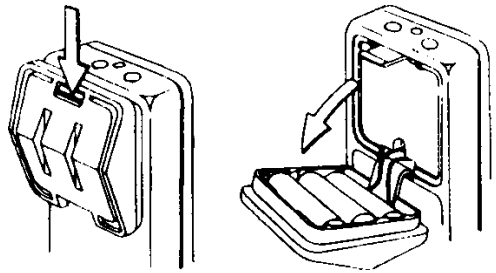
2. Push the DBS button to select either the 3:2 or 3:3 pattern. The display will indicate either “3:2” or “3:3”.

E. IMPORTANT NOTES:

- All programs are retained when unit is switched off.
- Programs are retained for 5 minutes when batteries are removed to allow sufficient time for battery replacement.
- If batteries removed for longer than 5 minutes, program features return to default, (see specifications).

BATTERY REPLACEMENT

To replace batteries use three 1.5 volt “AA” batteries



SPECIFICATIONS

OUTPUT CURRENT RANGE:
- 0-160 mA selectable in 10mA steps

TETANUS FREQUENCY:
- Programmable 50Hz or 100Hz

OUTPUT PULSE FORM:
- Square wave, constant current, monophasic, unidirectional

OUTPUT PULSE WIDTH:
- 195 μs ± 5μs

OUTPUT PULSE RISE/FALL TIME:
- < 10 μs maximum, (resistive load)

OUTPUT VOLTAGE:
- 350 volts, maximum

MAXIMUM LOAD IMPEDANCE
- TW, TOF, DBS - 4K ohms at 80mA, 3.5K ohms at 160mA
  TET, PTC – 1.8K ohms at 80mA, 1.3K ohms at 160mA

SET CURRENT OFFSET
- at 0-80mA ± 2.5mA
  at 85-160mA ± 5.0mA

ALARM TOLERANCE LIMITS
- ± 2.5mA of the set current

DEFAULT PROGRAM
- 10sec twitch

DEFAULT PROGRAM SETTINGS
- TET = 50Hz, Current Max = 80mA, Current steps 10mA, DBS = 3:3

POWER REQUIREMENT
- Internally powered. Three 1.5 volt “AA” batteries. Continuous operation.

BATTERY LIFE
- More than 300 hours continuous use with alkaline batteries

DIMENSIONS
- Height - 170mm
- Width - 73mm
- Depth - 43mm
- Weight - 0.18kg, (without batteries)

LEAD SETS (shrouded):
- 200NS033 (supplied): dome connectors.
- 200NS032: pin connectors.
- 200NS031: alligator clips.

ENVIRONMENTAL

	Operation	*Transport*	*Storage*
Temperature	5 °C to 30 °C	-10 °C to 60 °C	-10 °C to 60 °C
Humidity	0 % to 90 %	0 % to 90 %	0 % to 90 %

‘Ordinary equipment’

CONTACTS

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NOTE: US Federal law restricts this device to sale by, or on the order of, a physician.